

REMARKS

The title of the application has been amended, and paragraph 60 of the specification has been amended to correct a typographical error. Claims 1-35 have been cancelled. Claims 36-70 have been added and are pending in the application. Reconsideration is respectfully requested in light of the following remarks.

Objections to the Specification:

The Office Action objected to the title of the invention as not descriptive. Correspondingly, Applicant has amended the title as indicated above and respectfully requests removal of the objection to the specification.

Objections to the Drawings:

The Office Action objected to the drawings for failing to show features recited in claims 13-15. Applicant submits that this objection is moot in view of the cancellation of the corresponding claims.

Claim Rejections:

The Office Action rejected claims 1-3, 5-6, 9-10, 18-23, 27-28, and 32-33 under 35 U.S.C. § 102(b) as being anticipated by Gochee (U.S. Patent 5,732,272) (hereinafter, "Gochee"). Claim 35 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Poplingher (U.S. Patent 6,170,054) (hereinafter, "Poplingher"). Claims 4, 14 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gochee. Claims 7-8, 11-12, 16-17, 24-25, 29-31 and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gochee in view of Hoyt et al. (U.S. Patent 5,768,675) (hereinafter, "Hoyt"). Claim 13 and 34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gochee in view of "Stacks," April 2001 downloaded from www.funducode.com (hereinafter, "Stacks"). Claim 15 stands rejected under 35 U.S.C. § 103(a) as being

unpatentable over Gochee in view of Hoyt, and further in view of Tran (U.S. Patent 5,822,575) (hereinafter, “Tran”). Although Applicant traverses these rejections, Applicant submits that these rejections are moot in view of the cancellation of the corresponding claims. As set forth in detail in the following remarks, Applicant submits that claims 36-70 patentably distinguish over the cited art.

The cited art fails to teach or suggest all of the limitations of Applicant’s claim 36. In particular, the cited art fails to teach or suggest a microprocessor comprising a return prediction unit including a return storage and a controller, where the controller is configured to compare a return address of a previously detected call instruction stored in an entry in the return storage to a new return address of a subsequently detected call instruction, and in response to determining that the stored return address is the same as the new return address, to modify a count value stored in the entry to indicate that the stored return address corresponds to more than one call instruction, as recited in Applicant’s claim 36. Additionally, the cited art fails to teach or suggest that if the count value indicates that the stored return address corresponds to more than one call instruction, the controller is configured to provide a predicted return address to an instruction cache for fetching by providing the stored return address and correspondingly modifying the count value, also as recited in Applicant’s claim 36.

Gochee is directed to a technique for tracing execution times of subroutines that may be called using non-standard calling conventions. Specifically, Gochee provides a code stack 500 configured to store tail patches 602-606, where each tail patch has an associated counter 608-612 that “serves to notify the tail patch that when invoked it must log an additional exit event.” (Gochee, Abstract). However, Gochee does not teach or suggest any aspect of a return prediction unit providing a predicted return address to an instruction cache for fetching, as recited in Applicant’s claim 36. Further, Gochee fails to teach or suggest comparing a stored return address of a previously detected call instruction to a new return address of a subsequently detected call instruction, as recited in Applicant’s claim 36. Gochee discloses a head patch of a software subroutine compares a return address on the system stack with the address of a tail patch function

(Gochee, col. 4, lines 58-63). However, a tail patch function is “a small block of code that will execute at the end of [a] subroutine.” (Gochee, col. 1, lines 62-63) An address of a tail patch function in no way teaches or suggests a return address of a call instruction. In fact, Gochee suggests that the tail patch must execute before returning to the point of the call (i.e., the return address of the call) or else exit events for the corresponding subroutines will not be properly recorded (Gochee, col. 2, lines 44-47). Thus according to Gochee, the address of the tail patch function (which must execute before the call return) must be something other than the address of the call return.

Hoyt discloses a return stack buffer 21 configured to store a stack of return addresses. However, Hoyt does not teach or suggest any aspect of providing a count value associated with a return storage entry, where the value of the count is modified if a stored address of a previously detected call instruction is the same as a new address of a subsequently detected call instruction, as recited in Applicant’s claim 36. Further, Hoyt fails to teach or suggest that if the count value indicates that the stored address corresponds to more than one call instruction, a predicted return address is provided to an instruction cache for fetching by providing the stored address associated with the return storage entry and correspondingly modifying the count value, as recited in Applicant’s claim 36. Additionally, neither Poplingher, Tran nor Stacks teach or suggest these limitations.

Applicant further submits that the combination of the cited art does not render the invention as described in claim 36 obvious. In particular, none of the references provides a teaching or suggestion to combine the subroutine-tracing technique of Gochee with the return stack structure of Hoyt, and none of the references provides a motivation to do so. Gochee is directed to an entirely different problem, i.e., the accurate tracing of subroutine calls, than Hoyt, Poplingher or Tran, which are directed to speculative execution in microprocessors. Accordingly, Applicant submits that claim 36 is patentably distinguishable over the cited art. Further, Applicant submits that claims 52 and 65 having limitations similar to claim 36 are patentably distinguishable, as are those claims depending from claims 36, 52 and 65.

CONCLUSION

Applicant submits the application is in condition for allowance, and notice to that effect is respectfully requested.

If any extension of time (under 37 C.F.R. § 1.136) is necessary to prevent the above referenced application from becoming abandoned, Applicants hereby petition for such extension. No fees are believed due. However, if any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5500-74800/BNK.

Also enclosed herewith are the following items:

☒ Return Receipt Postcard

Respectfully submitted,



B Noël Kivlin
Reg. No. 33,929
ATTORNEY FOR APPLICANT(S)

Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C.
P.O. Box 398
Austin, TX 78767-0398
Phone: (512) 853-8840

Date: 12-21-04